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Wilcox, D G, Ripley, J, and Johnson, R F. (1977), *Visit of working party on North Kimberley Agricultural Development to the area in July 1977*. Department of Primary Industries and Regional Development, Western Australia, Perth. Report 5.

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ISSN 0729-3135
July 1977



Visit of Working Party on North Kimberley Agricultural Development to the Area in July 1977

**D.G. Wilcox, Department of Agriculture
J. Ripley, Department of Agriculture
R.F. Johnson, Department of Lands and Survey**

Resource Management Technical Report No. 5

Disclaimer

The contents of this report were based on the best available information at the time of publication. It is based in part on various assumptions and predictions. Conditions may change over time and conclusions should be interpreted in the light of the latest information available.

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1. Summary

This report suggests that the area of land suitable for Townsville Stylo in the North Kimberley above the 750 mm rainfall isohyet is about 1.25 million hectares. It is possible that amendments to the original North Kimberley report could increase the area by up to 1,000,000 ha.

The regions in which land suitable for Stylosanthes can be found are shown on the attached map.

A brief description of the suitability of the land systems of the region for Stylosanthes is given.

About 23,000 ha of land are currently sown to Townsville Stylo in the Kimberley. A further 113 ha has been developed as agricultural land.

The working party was unable to agree on the productivity of Townsville Stylo or upon the turn off weights of animals produced from these and the size of cattle unit required for viability. Consequently two sets of conclusions have been drawn.

Wilcox and Ripley assess the carrying capacity of T.S. as 1 beast to 4 ha per annum and the native pasture as 1 beast to 25 ha per annum. Turn off weights are assessed as 230 kg d.wt. for steers and 170 kg d.wt. for cull cows. The farm unit is assumed to be about 6,850 cattle including 3 000 breeders.

Using farms which have 10% and 50% Stylo respectively Wilcox and Ripley conclude the following.

	10% Stylo	50% Stylo
Farm Size - Stylo area ha	11,500	24,000
- Native pasture area ha	100,000	24,000
Cattle no. turn off	1,370	1,712
Turn off %	20	25
Income at 1977 prices \$	108,276	142,947
Running costs \$	<u>98,000</u>	<u>162,830</u>
Surplus/Deficit \$	+10,276	-19,883

The surplus in the 10% stylo example provides a return of 1.2% on the investment of about \$0.9 million. The meat price needs to rise by 73% above the 1977 price to provide a 10% return on \$0.9 million invested. The deficit in the case of the 50% stylo example represents a -1.7% return on the \$1.2 million investment and in this case the cattle price must rise by 96% to return 10% on the invested capital.

It is estimated that cattle prices will need to rise by 70-100% above 1977 prices to provide an inducement for those with the capital or for those who need to borrow money, to undertake stylo development in the manner suggested.

Wilcox and Ripley therefore conclude that, using these assumptions, it is unlikely that individuals will wish to take up land in the Kimberley for intensive development. If

cattle prices improve, existing lessees may gradually extend the area of improved pasture provided that some security is given to the lessee and that the Pastoral Appraisal Board retains some control over the use of the land. Dependent upon the proportion of T.S. land farm size will range from 48,000 ha (50% T.S.) to 111,500 ha (10% T.S.)

R.F. Johnson concludes that stocking rates of up to 1 beast to 1.25 ha are possible on T.S. and 1 beast to 17 ha on native pasture. He is of the view that a herd size of 4,000 total animals including 2,400 breeders is sufficient for viability. Turn off weights are 350 kg l.wt. for steers and 175 kg for cows. One budget is supplied. It is as follows:

Farm size	5,000 ha Stylo)	
	68,000 ha native pasture)	73,000 ha
Turn off	704 steers	216 cull cows	
Total annual cost	\$118,059		
Total annual return	114,086		
Loss	3,973		
Meatworks price increase			
Required for viability	\$0.014 cents/kg		

While viability is achievable at a much lower increase in meatwork returns, the high capital costs of the venture are likely to deter most individuals.

The size of farms in Mr. Johnson's budget would be about 75,000 ha.

A report on agricultural cropping at Beverley Springs is included.

A summary of the interviews conducted on the North Kimberley visit is attached as an appendix.

2. Introduction

Following the submission of their report and recommendations on agricultural development in the North Kimberley area, the Working Party, consisting of D.G. Wilcox (Convenor) and J. Ripley of the Department of Agriculture and R.F. Johnson of the Department of Lands and Surveys, recommended to the pastoral Appraisal Board that they should make an inspection of the area in order to clarify a number of issues. The Board agreed with this proposal. This report deals with the findings of the Working Party as a result of- their visit to the area in July 1977.

3. Objectives of the Visit

There were several objectives of the visit and these can be discussed under two broad headings:

3.1 Townsville Stylo and Other Pasture Species

- i) to discuss with station managers their experiences with Townsville Stylo in terms of establishment, maintenance and productivity;
- ii) to make an assessment of the uses made of Stylosanthes pastures;
- iii) to substantiate the recommendations of the initial report;
- iv) to survey briefly the Dampier Peninsula in that area receiving 750mm rainfall;
- v) to study the area with the aid of the Kubicki-Beer North Kimberley report of 1973

3.2 Agricultural Development

- i) to investigate the agricultural output of Beverley Springs station.

4. Itinerary

The party met at Broome on July 18, 1977 and subsequently visited the following areas:

July 18	Beagle Bay Mission	His Lordship Bishop Jobst
July 19	Cygnets Bay Cultured Pearl Area	Mr. Bruce Brown
	Lombadina Mission	Father Peter Murray
July 20	Broome - Derby - Napier Downs	Mr. R. McCorry
July 21	Beverley Springs	Mr. Nixon (Junior) Agricultural areas and areas sown to pasture
July 22	Beverley Springs	pasture areas
July 25	Mt. Elizabeth	Mr. Peter Lacey, Department of Agriculture trial plots
July 25	Doongan	Mr. Tony Doyle
July 26	Kalunburu	Father Sanz
		The party split up at this point
July 27	Drysdale Rive	D.G. Wilcox, B. Kok, S. Lillyman
July 28	Drysdale River to Kununurra	

Brief notes on the above properties are contained in the appendix to this report.

5. Townsville Stylo and Other Pasture Species in the Kimberley

5.1 *General Impressions*

The overriding impression (and this is all it could be with such a short stay) is one of a vast area of shallow skeletal and rocky soils with much rugged and mountainous country completely unsuitable for the introduction of pasture species. The areas considered suitable for pasture introduction are restricted in size and do not occur in very large contiguous blocks except in the valley of the Drysdale River. The group considered that the Kubicki-Beer report generally depicted the distribution of suitable country. It tended to be conservative in the Napier Land System and possibly in Kennedy and Pago, but adjustments here would alter the amount of land suitable for exotic pasture species only slightly upwards by perhaps 1000 sq km in a total area surveyed of 88,000 sq km.

The map associated with this report shows the general distribution of land systems suitable for Townsville Stylo. This map is intended to be a guide only. It does not pretend to show the complex mosaic of occurrence of suitable land within land systems. Parts of the land systems shown and hachured are definitely unsuitable for Townsville Stylo production.

The area suitable in each land system varies from 16% in Foster to over 80% in Yeeda and Camelgooda. In general, a lesser amount of the land systems is suitable for *Stylosanthes* in the southern part of the area, where the influence of the structural elements of the Kimberley surface are more prominent, ranges such as the King Leopold and the Sinnot influencing the proportion of rock and skeletal soils in those land systems near them. The map should therefore be studied in conjunction with Zubicki-Beer 1:250,000 sheets that show areas of moderate and high suitability very clearly. The 250,000 maps only should be used in the determination of policy concerning development.

It will be seen that the main occurrences of land suitable for *Stylosanthes* are in the Dampier and Yampi Peninsulas and in the central part of the North Kimberley. This latter area is flanked on the east and west by extensive rugged ranges and rocky uplands. The CSIRO reports were used for the Dampier and Yampi Peninsulas and for the eastern side of the Kimberley as the Kubicki-Beer report did not deal with these sections.

5.2 *Observations on the Suitability of Particular Land Systems for Townsville Stylo and Other Stylosanthes Species*

This section should also be read in conjunction with the Kubicki-Beer report.

5.2.1 Barton Land System

This system derived from basalts contains extensive areas of igneous red earths regarded as highly suitable by Kubicki and Beer, together with smaller areas of lateritic podsoils and river levees. The Department of Agriculture trials on Mt.

Elizabeth station are on igneous red earths. These soils are suitable for perennial stylo species, but it is considered that they could present agronomic problems due to sealing during the dry period as this tends to make self-regeneration difficult for annual species of stylo. This appears to be one of the contributing factors to the poor performance of Townsville Stylo at Mt Elizabeth where, in contrast to other species, this annual has performed poorly in successive years.

5.2.2 Reeves Land System

This system encountered on the Dampier Peninsula is only partly suitable for Townsville Stylo since it is rocky. However, selected areas can be converted to productive pasture. The area is nowhere large.

5.2.3 Carpentaria Land System

The upper margins of Carpentaria could be used as well as the inland portions of the upper parts of this littoral system within the interior of the land mass. It has been successfully sown at Cygnet Bay and at Beagle Bay, but the area sown here does not exceed 50ha.

5.2.4 Yeeda, Camelgooda, Cockatoo, Vanganut and Luluigui Land Systems

These deep sandy systems are theoretically ideal for Stylosanthes. They may present problems in the establishment if rainfall falls erratically as they will dry out rapidly following rain. It is suggested that seeding beneath a low, burnt grass cover will be essential in this environment if a desirable micro-environment for germination is to be maintained. Very little of these land systems has been sown. They form the major part of the Dampier Peninsula and part of the Yampi Peninsula. Provided that establishment problems can be overcome, these areas are promising for Stylosanthes species.

5.2.5 Foster land System

This is the lateritic system of the North Kimberley and particularly the Mitchell Plateau. Part of it contributes the store of bauxite owned by AMAX on Mitchell River and Doongan Stations. The landforms are strongly reminiscent of the Darling Range region. Heavy gravelly soils, podsoles and lighter sandy soil with gravelly strew are common. Most of that land on Doongan and Mitchell River sown to Stylo has been Foster Land System. Fertiliser practices similar to those practised in the south west, i.e. Copper, Zinc and Molybdenum fertilisers should materially improve the pasture response over that achieved with straight phosphate fertilisers.

5.2.6 Isadell Land System

Parts of this system were sown on Beverley Springs, but it was only on the basalt units that Stylo was successful. The black soil plain units failed to support Townsville Stylo whenever it was planted on them. Repeated questioning on every property demonstrated that these heavy cracking clay soils (Fossil Land System or black soil plains) were totally unsuitable for pasture species. In our opinion, other species of Townsville Stylo would also fail on these clay soils.

5.2.7 Kennedy and Pago Land Systems

These land systems can be considered together since they amount to over half of the land suitable for Stylo in the North Kimberley. In the South they tend to have more rocky uplands than in the North and are therefore inherently less productive. Most of the parts with deeper soils will be suited to Stylosanthes. It should be easy to prepare the ideal seed bed environment and both land systems lend themselves to the wet-burn technique.

5.2.8 Other Land Systems

A number of other land systems such as Tarraji, Mandeville, Egan and Sisters on the Yampi Peninsula were not inspected. Neither were Angillari and Wingate in the region of Kununurra. However, from prior knowledge, it appears as though parts of these should be suitable for Townsville Stylo.

5.3 Area of Pasture Establishment

About 23,000 have been sown to Townsville Stylo and other species in the North Kimberley. The table below lists the amount sown on each of the properties inspected. The data was obtained at interviews and from lessees' information supplied to the Chief Pastoral Inspector.

Beagle Bay	120ha
Beverley Springs	3642ha
Cygnets Bay	16ha
Doongan	8497ha
Mitchell Paver	.4856ha
Drysdale River	2199ha
Kalunburu	
(Freehold)	500ha
(Reserve)	1000ha
Carson River	1000ha
Lombadijia	7ha .
Ellenbrae	809ha
Mt House	324ha
Theda	200ha

Two sowing methods have been adopted. For large areas the Stocker-Sturz wet-burn technique has been used, but for smaller areas, for instance those on Drysdale River, the paddocks have been cleared, windrowed and cultivated. Both methods appeared to give satisfactory stands, though it appeared as though the cultivation method was superior on heavy soils.

Between 50 and 100kg/ha of single super equivalent was usually applied at establishment. In some instances a further 100kg/ha was applied in one subsequent year. In almost all cases no applications of phosphate have been made since 1974, probably as a result of the downturn in cattle prices.

It appears as though biennial or triennial dressings of super-phosphate will be required to maintain pastures of Townsville Stylo.

5.4 Use made of Townsville Stylo

Townsville Stylo pastures in the North Kimberley have been used to carry mustered animals, to hold bullocks, to carry cows and calves and to finish bullocks. Grazing practices did not seem to be related to optimum animal performance but rather to the opportunity the pastures gave to management, allowing it to reduce conventional mustering costs.

We were able to obtain some figures on the y.i.y.o. carrying capacity of Townsville Stylo at Doongan and Drysdale. On both properties, selected areas of the improved pastures were devoted to grazing and haymaking. At Drysdale the carrying capacity of the Townsville Stylo paddocks was estimated to be 1 beast/4ha. Hay cuts average about 2000kg/ha, which is also equivalent to about 1 beast to 4ha. At Doongan the carrying capacity was estimated to be lower, at 1 beast to 4.8ha.

At Kalumburu, carrying capacities of 1 beast to 1.6ha were considered possible. However, this estimate must be considered to be unreliable since animals had access to native pasture for extended periods. At Beverley Springs, grazing capacities of up to 1 beast per hectare and higher were quoted, but these must be discounted since the animals often had access to large natural grazing areas. In other instances at Beverley Springs, cattle were kept at high concentrations on Townsville Stylo only for short periods but there was no record of their performance during this period.

At the lit Elizabeth trial area it appears as though 1 beast to 2.5ha is over optimistic and that a beast to 3.5 or 4ha is more realistic. This observation applies even to "Verano" and S scabra.

6. Conclusions Drawn from the Inspections Made

There is some polarisation in the conclusions drawn by the members of the working party on the existing and potential productivity of the areas suited to pasture development in the North Kimberley. Because of an inability to reconcile these two points of view, two sets of conclusions are being presented in this report. The first by J. Ripley and D.G. Wilcox and the second by R.F. Johnson. The disparity of viewpoint extends beyond the estimates of potential carrying capacity and includes differences in concepts of what is the minimum economic size or herd.

6.1 Conclusions by D.G. Wilcox and J. Ripley

The evidence gathered on this visit supports the contention contained in the original report that a stocking rate equivalent to a beast to 3.7ha is a safe base upon which to design farming properties. It is possible that higher stocking rates may apply, but at this time it would be most unwise to assume anything to the contrary of a beast to 3.7ha. We are strongly of the view that farm design in this isolated area should err on the side of conservatism rather than optimism and are encouraged in this by the general experience that farm sizes in new areas are initially too small.

The Department of Agriculture trials at Mt Elizabeth and the hay cutting and stocking rate experiences at Drysdale and Doongan on Townsville Stylo alone indicated that a stocking rate of approximately 1 large stock unit to 4 hectares is feasible. A number of higher carrying capacities were quoted to us, but it must be emphasised that these:

- a) did not allow for use of the native pastures which were available to animals at the same time
- and
- b) there was insufficient information on the performance of the animals on these pastures since for the most part they were merely held on the pasture pending some decision on their disposal or to assist the mustering programme.

We were thus unable to judge adequately the performance of Townsville Stylo pastures other than those on Doongan and Drysdale where the carrying capacities which we have suggested applied.

We also examined the prospects for 100% Stylo operations. However, we were not able to judge the significance of the "put and take" of cattle since virtually all sown areas were associated with open grazing or native pastures. The evidence which is accumulating on phosphate-induced annual grass build up and nitrogen-induced fluctuations in grass production suggests that for pasture control it will be necessary to have areas of natural pasture associated with improved pastures. It is important to realise that in the tropical summer rainfall environment, native perennial grasses are aggressive and recolonise disturbed areas quite readily. This is in sharp distinction to the temperate winter rainfall area in the south of Western Australia where low shrubs are quite easily displaced and remain suppressed following pasture

establishment. We are of the opinion that different techniques of pasture management will apply in the Kimberley to those accepted in the south.

In this context it is worth noting that the successful establishment of subterranean clover as a pasture legume in southern Australia has been the result of a sustained and prolonged effort by legions of scientists and farmers. There is no indication that this input will be available for the Kimberley region. While research may reveal some time in the future that higher stocking rates are feasible in the Kimberley on improved pasture, there is no guarantee that this is likely to be so. Accordingly, therefore, we see no reason to depart from the view on stocking capacity expressed above and are of the opinion that the development of the North Kimberley should follow the pattern discussed in the original report.

The budgets presented below provide information of the size of the capital inputs required to establish "Stylo Farms", the size of the annual turn-off and the cattle prices which would be required to service the debt loads incurred.

This part of the report uses, in part, the evidence obtained from pastoralists who have established Stylo in the North Kimberley. The data available, however, were incomplete. We have attempted to remedy this deficiency by including information obtained from other sources in respect of fertiliser, machinery and application costs. Although no Stylo pastures have been fertilised for the past three years in North Kimberley as a result of economic downturn, we have included subsequent applications on a three yearly basis since we were advised that productivity still remained acceptable.

The economic assessment is based on the following criteria:

- a) carrying capacity for a "viable" unit - 6800 adult cattle
- b) carrying capacity of natural pasture - 1 beast/25ha
- c) carrying capacity of Stylo pasture - 1 beast/4ha

Two further assumptions are made:

- i) 10% of land being suitable for Stylo development
- ii) 50% of land being suitable for Stylo development

Turn-off rates – 20% and 25% respectively.

Thus two separate budgets for returns and inputs are provided.

6.1.1 Budget Details of Costs of Stylo Establishment and Maintenance

The paddock sizes are as follows:

Stylo	2,000ha
Native Pasture	25,000ha

Established by the wet-burn method.

Fertiliser 50kg of double super/ha at establishment.

Seed and super applied by air.

Establishment Costs	\$/ha
Burning	1.50
Seed 5kg Stylo/ha	7.50
Double super 50kg/ha @ \$212/t including freight	10.60
Aerial seed and fertiliser application	<u>1.50</u>
	<u>\$21.10</u>

Annual Maintenance Costs

Double super equivalent of 20kg/ha/year - applied once every 3 years by air.

Annual maintenance also includes repair costs as a per cent of replacement value and are as follows:

i) Fencing and Water Supply	1%
ii) Buildings	2%
iii) Plant and Vehicles	10%

Plant Replacement

An allowance is made at the rate of 15% of replacement value.

Cattle Run

Breeding Cows	3,000
Heifers and Steers over 1 year old	<u>3,850</u>
	<u>6,850</u>

Turn-off Numbers

1,370 from 10% Stylo area and 1,710 from 50% Stylo area.

Plant required for both 10% and 50% stylo block areas

Plant includes 2 motorbikes, stock truck 4 WD vehicle, car ute, welders, tools, etc.

6.1.2 Costs of Establishment for the 10% Block

		Cattle carrying capacity
Area required for Stylo	11,500ha	2,875
Area required for Native pasture	<u>100,000ha</u>	4,000

111,500ha

Cost of Establishment

Fencing 5 Stylo Paddocks	100 km	\$	
Fencing 4 Native Pasture Paddocks	<u>180 km</u>		
	280 km @ \$600/km		168,000
Water Supply 4 bores + Equipment \$12,000 each			48,000
Housing and Sheds			50,000
Plant			35,000
Stylo Establishment			
11,500 ha @ 321.10			242,650
Stock 6,850 cattle @ \$50			<u>342,500</u>
			<u>886150</u>

Annual Costs

Fertiliser 220t @ \$212 including freight	46,640
Aerial application 50c/ha	5,750
Labour (2 units)	15,000
Repairs and Maintenance	6,660
Fuel and Oil	3,000
Plant Replacement Allowance	5,250
Freight Cattle Sales (\$10/beast)	13,700
Sundry Costs	<u>2,000</u>
	<u>98,000</u>

6.1.3 Cattle weights and returns from 10% stylo

Steers and speyed heifers	970 @ 230 kg	223,100
Cull cows	400 @ 170 kg	<u>68,000</u>
		<u>29,100 kg</u>

Estimated income using July 1977 cattle prices
(Ox 44 c/kg; cow 15 c/kg, average 37.2 c/kg dressed weight)

970 steers, etc. @ \$101.10	98,067
400 cows @ \$25.00	<u>10,200</u>
Total income	108,267
Less annual running costs	<u>98,000</u>
Surplus	<u>10,267</u>

The above surplus represents a 1.2% return on the investment.

Should the investment require a 10% return then \$88,615 is added to the costs and cattle meat prices will need to rise to an average of 64 c/kg to allow for this added cost.

The 64 c/kg price is based on present day running costs, so if there is a cost price squeeze the long term meat price will need to be more than 64c.

6.1.4 Cost of Establishment of 50% Stylo Blocks

		Cattle carrying capacity
Area required for Stylo	24,000 ha	6,000
Area required for Native Pasture	<u>24,000 ha</u>	<u>960</u>
	<u>48,000 ha</u>	<u>6,960</u>

Cost of Establishment

Fencing 10 Stylo Paddocks	200 km	
Fencing 1 Native Pasture Paddock	<u>60 km</u>	\$
	260 km @ \$600/km	156,000
Water Supply 8 Bores + Equipment \$12,000 each		96,000
Housing and Sheds		50,000
Plant		35,000
Stylo Establishment 24,000 ha @ \$21.10		506,400
Stock 6,850 @ \$50		<u>342,500</u>
		<u>1,185,900</u>

Annual Costs

Fertiliser 580t @ \$212 including freight	101,760
Aerial application 50c/ha	12,000
Labour (2 units)	15,000
Repairs and Maintenance	7,200
Fuel and Oil	2,500
Plant Replacement Allowance	5,250
Freight Cattle Sales (\$10/beast)	17,120
Sundry Costs	<u>2,000</u>
	<u>162,830</u>

6.1.5 Cattle weights and returns from the 50% stylo area

Steers and speyed heifers 1,312 @ 230 kg	301,760
Cull cows 400 @ 170 kg	68,000
Total meat dressed weight	369,760 kg
Estimated income using July 1977 cattle prices (Ox 44 c/kg; cow 15 c/kg, average 38.8 c/kg)	
1,312 steers, etc. @ \$101.10	132,774
400 cull cows @ \$25.50	10,200
Total income	142,974
Less annual running costs	<u>162,830</u>
Deficit	<u>\$19,856</u>

Future cattle meat prices will have to increase to 44.1 c/kg to allow the operation to break even. The price will also need to increase to 76.2 c/kg to allow for a 10% return on the investment. The price increases required are based on present day running costs so if there is a future cost price squeeze the long term meat prices will need to increase by more than the amounts suggested.

6.1.6 Conclusions

On the basis of the above, Wilcox and Ripley have drawn the following conclusions:

- a) The economic analysis is not much different to that done for the original report. It is considered that individuals will be unlikely to take up land in the Kimberley for the purposes of improved pasture development. This form of activity is likely to be left to large companies that have no need for immediate cash flows.

If cattle prices improve it is possible that present owners of leases will continue with the development of improved pastures for, in addition to improved cattle performance, the use of these pastures substantially reduces mustering costs. The Board should give some consideration to recommending that such areas be allowed as special leases within the pastoral. It is recognized, however, that special leases administration does not fall within the responsibility of the Board.

- b) Properties will need to be of about the size indicated in the previous report. It is considered that smaller farms will be unsatisfactory and that Stylosanthes species on their own will not form the basis of a farming system. For the reasons given here and in the original report the working party considers that land not suitable for Stylosanthes and land suitable for it should be incorporated into farms or leases.
- c) A much more detailed survey of the land would be required before farms or leases are designed or committed.

6.2 Conclusions drawn by R.F. Johnson

R.F. Johnson has expressed the view that a number of the assumptions made in the previous economic assessments err on the conservative side. He considers that stocking rates on both native pastures and stylo will be better than those suggested by Wilcox and Ripley. This of course makes a considerable difference to the profitability of any enterprise in terms of the breakeven price required in cents per kilogramme of carcase weight. Using R.F. Johnson's figures, profitability is ensured at a lower price at the meatworks.

Mr. Johnson is of the opinion that a stocking rate of one beast to 1.2 ha is possible on Townsville Stylo, only in the dry season, and that 1 beast to 17ha is attainable of native pastures grazed in the period December to April. The experience at Kalumburu, in Mr. Johnson's view, supports the contention that stocking rates higher than those suggested by Wilcox and Ripley are possible on Townsville Stylo pastures. Since the Kalumburu cattle were grazing at an average rate of a beast to 0.4ha, it should be possible to achieve the overall average rate of a beast to 1.25ha on Townsville Stylo. Mr. Johnson feels that the weight gains of up to 1.02 kg per day on introduced Birdwood grass pastures at Collins Yard, Fitzroy Crossing in Dept. of Agriculture trials suggest that these higher weight gains and stocking rates are possible on Townsville Stylo in better rainfall areas.

Mr. Johnson also disagrees with the turn-off weights adopted by Wilcox and Ripley. He considers that mature 3 year old steers and young speyed heifers will dress out at 350 kg and that the cull cows will average 175 kg. He feels that these higher turn off weights will result from the greater husbandry inputs and quieter cattle which can be achieved once cattle are controlled.

R.F. Johnson supports most of the other assumptions concerned with the development of the budgets drawn up by Wilcox and Ripley with the exception of the numbers of animals required in the herd to achieve economic viability. In the budget presented by R.F. Johnson, the herd size is limited to 4,000 animals, including 2,400 breeders. The turn-off is estimated to be 23 per cent of all animals and the weights at turn-off higher.

6.2.1 Budget by R.F. Johnson

The following assumptions are made

- 1) Carrying capacity of the native pasture is 1 beast/17ha when grazing December to April.
- 2) Carrying capacity of the Townsville Stylo pasture is 1 beast/1.25ha when grazing Kay to November.
- 3) Turn-off weights will be
 - (a) 3 y.o. steers and cull cows 350kg carcase wt.
 - (b) Cull cows 175 kg carcase wt.

- 4) Turn-off is 23% of the herd = 920 cattle (steers and cull cows)
 5) The total herd size is 4000 cattle made up of breeders and followers as follows

breeders	2400
followers	1600

Requirements

68,000ha native pasture
 5,000ha Townsville Stylo

Turn-off 23% of herd

704 steers and speyed heifers @ 350kg = 246,400kg

216 cull cows @ 175kg = 37,800

284,200kg

Estimated income on average 1976-77 prices
 (ox 44c/kg) (cow 15c/kg)

	\$
704 steers	108,416
216 cows	<u>5,670</u>
	<u>114,086</u>

Initial establishment costs including pasture and stock fencing.

4 Stylo paddocks	55km - 4 paddocks	1,000ha each
4 native pasture paddocks	<u>156 km</u> - 4 paddocks	17,000ha each

211km @ 600/km 126,600

	\$
Water supply 4 bores equipped	40,000
Housing and sheds	50,000
Plant	16,000
Stylo establishment	
5000ha @ \$21.10/ha	105,500
Stock 4,000 cattle @ \$50	160,000
10 horses	1,000
yard	8,000
fuel and stores	<u>1,000</u>
	508,100

Annual Costs

Fertiliser 100 tonne @ \$212/tonne including freight	21,200
Aerial application 50c/ha	2,500
labour - 2 units	15,000
Repairs and maintenance	6,660
Fuel and oil	3,000
Plant replacement allowance	5,250
Freight on cattle sold @ \$10 per beast	9,200
Sundry costs	<u>2,000</u>
	64,810

Total Annual Costs

Running costs	67,249
Interest @ 10%	50,810
Total expenditure	118,059
Earnings (gross)	114,086
Loss (gross)	3973

The present overall (ox and cow) cents/kg price is 39 cents; to reach a breakeven figure, the overall cents/kg price would have to rise to 40 cents/kg.

7. Agricultural Development at Beverly Springs Station

This property was the subject of a separate investigation on the agricultural activities practised by the lessee.

The agricultural area is one of about 490ha near the homestead and has been fenced into five paddocks (A-E) of varying sizes. It is on these that a number of crops have been grown and harvested. As the lessee, Mr. J Nixon, was absent, it was not possible for us to obtain precise figures on his agricultural activities, although he has provided some information in a recent letter. The development of the land for agricultural crops followed the same pattern in each year. Each paddock was bulldozed and heavy timber cleared and burnt when necessary. It was then disc ploughed. After rain in early summer it was scarified and then urea and phosphate fertilisers were drilled into the ground. The crop was sown following further rain later in the summer. In some instances Townsville Stylo was sown with the crops and in others it was allowed to invade from neighbouring areas after the cropping phase was completed.

Paddock A - 64HA

This paddock has grown two crops of sorghum and one of sunflower using 40kg/ha of doublesuper and 30kg/ha of urea per hectare. It was originally sown in 1972. In 1975-77 it has been grazed at various rates by cattle, horses and pigs. There are about 100 pigs currently grazing the area and these are sold as porkers to the Derby market.

Paddock B - 130HA

This has been sown to Townsville Stylo, but also has had varying amounts of sorghum and sudax hay. At present it is used for grazing only. It was not possible for us to determine YIYO stocking rates nor any indication of animal performance.

Paddock C - 100HA

This paddock was sown to sorghum in 1973. No Townsville Stylo was sown here but the plant was seen to be spreading naturally. Three sorghum crops were taken off the area*

Paddock D - 66HA

Only 33ha of this paddock is suitable for agricultural development. It has been sown to cowpeas and mungbeans. No Townsville Stylo has been established.

An additional area of sorghum was grown outside the agricultural areas. It is presumed that all these crops are listed in the following table of production from agricultural crops given to us by Mr Nixon.

Sorghum	Area	Total Yield	T/Ha
1972	81ha	150 tonnes	1.85
1974	263ha	450 tonnes	1.71
1975	40ha	75 tonnes	1.87
1976	40ha	100 tonnes	2.50
1977	40ha	75 tonnes	1.87

Hay	Area	Total Yield	T/Ha
1974	20ha	100 tonnes	5.00
1977	20ha	150 tonnes	7.50

Mung Bean	Area	Total Yield	T/Ha
1977	20ha	10 tonnes	0.50

Cereal crops were sown with 20kg/ha of double super and 30kg of urea. No urea was applied to the Mung Bean.

7.1 Conclusions

There appears to be no valid reason for crops to be unsuccessful at Beverley Springs. The yields for rain fed crops are just acceptable though fertiliser costs would be high. Mr Nixon's rate of application would cost him about 45c/ha for superphosphate and about 60c for urea. It is questionable whether these low rates will apply for long.

SIGNED

D G Wilcox **(Convenor)**

A handwritten signature in cursive script, appearing to read 'D G Wilcox', is written on a horizontal dotted line. The signature is positioned above the first of three dotted lines in the signature area.

J Ripley **(Member)**

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R F Johnson **(Member)**

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8. Appendix

Summary of Townsville Stylo (*Stylosanthes humilis*) establishment and performance of various properties in the North Kimberley region.

Lombadina Mission

Rainfall: 625mm January to April mainly January/February.

Area of *Stylosanthes humilis* 7.2ha sown in 1976 on Yeeda soil type. No fertilizer was applied with the Stylo and seeding rate was unknown. The seed was obtained from Kalumburu and was sown in a cultivated area. The object of the establishment was to use the area as cattle and horse paddock.

The paddock was established on a large underground water supply and is being irrigated.

At present there are no records of carrying capacity or productivity from the Stylo area.

The value to date has been marginal. The Stylo establishment is fair.

Beagle Bay Mission

Rainfall: 625mm December to March with most rain January and February.

The Stylo was established over 120ha by spreading the seed without fertilizer on a sandy element of Carpentaria land system. No cultivation or clearing was done. The date of establishment is not known. The Stylo content in the area has been reduced with time but no attempt has been made to manage the area by grazing or by the application of fertiliser.

Cygnets Bay Cultured Pearl Farm

Rainfall: 675mm January to March mostly in January/February. The areas are sown on a special lease granted for the purpose of cattle raising.

16ha of Stylo was established between 1973 and 1977 including 11ha of Townsville Stylo, 3ha of "Verano" (*S. hamata*) and a Verano-Townsville Stylo mixture and 2ha of straight "Verano". The Stylo has been sown mainly on Reeves/Carpentaria land system with some on the Reeves system.

The Stylo has been established by a variety of methods including dozing, windrowing and burning the timber followed by cultivation and seeding. Some areas were established with light cultivation and seeded and other areas were established by burning and seeding. All the areas except one were top-dressed with 195kg of No 1 mix superphosphate per ha. Since that time all paddocks more than 1 year old have been top-dressed with superphosphate at 195kg/ha per year.

The carrying capacity of the Stylo stands is difficult to estimate as they form parts of larger paddocks, and cattle have only been run for 2 years.

One paddock of 2.8ha carried 28 cattle for 1 month. Grazing of the Stylo is only done during the dry as the owners consider grazing of the green crop reduces the density of the stand.

The stands are in reasonable condition, although the density of the most recently planted areas is low.

4.8km of fencing has been erected for the Stylo areas.

The long-term objective of the Stylo development is to establish Hamata and Birdwood over the whole lease 1200ha. The cattle produced will be used to feed people employed in the pearling farm and some will be sold. The maximum allowable area to be cleared on the lease is 200ha. Electric fencing has proved successful for cattle control.

The Stylo and pasture improvement on this lease will continue as long as these lessees have surplus funds. The soil types on which they are developing Stylo are considered to be only marginally suitable.

Drysdale Station

Rainfall: 750mm spread during October to the end of March mainly in January/February.

Area of Townsville Stylo is 2,220ha.

The Stylo areas are in various paddocks on the Kennedy land system and were sown about 1972/73.

The establishment has been mainly done (1,480ha) by burning and spinning on the seed. The other paddocks were established by clearing trees, by windrowing, and burning the timber and by cultivating and spreading the seed. All the areas were established using 50kg double super/hectares. No fertiliser has been applied since the original application at the time of establishment.

Most of the established areas are part of larger paddock systems. One paddock of 120ha has been fenced off. The carrying capacity of the Stylo paddocks is estimated at 1 beast to 4ha. 1,500 bales of hay were harvested from 8ha and the estimated weight of bales was 11kg. A carrying capacity derived from these figures is 1 beast/4ha assuming some residues to be available and a consumption level of about 30-40 per cent.

Details of establishment costs are not available because of ownership changes since the property was taken up in 1968. The only stock that has been sold since 1968 are scrub bulls and the number sold is small. Management of the property has been difficult because of financial restrictions by the owners

Doongan Station

Rainfall: 755mm November to April with most rain in January/February.

Townsville Stylo has been established between 1971 and 1974 and totals 8,497ha. The method of establishment consisted of burning and aerial seeding at the rate of 5kg/ha plus aerial supering at 55kg/ha. In 1974, 1,320ha of Townsville Stylo and "Verano" (*S. harnata*) were sown (3kg/ha *S. humilic* and 0.5kg/ha of *S. hamata*) included in the above total area.

The establishment has been followed up by 100kg/ha of superphosphate. The Stylo areas were established in fenced areas - 7 paddocks containing approximately 1,340ha. The land systems were Foster and Pago.

The Stylo establishment has involved approximately 120km fencing and 4 equipped bores with the cattle also making some use of natural waters. Present cost of equipping a bore is \$12,000 and fencing costs \$600/km for 4 barb, posts and droppers. Other equipment associated with Stylo includes tractor and front-end loader for loading the seed plane. Cost of aerial seeding and supering is \$1.50/ha.

The estimated carrying capacity of the Stylo areas is 1 beast per 4.8ha. The areas established with Stylo species had a very low carrying capacity under natural pasture. The natural carrying capacity of the station as a whole is to be 1 beast/24ha with some areas being as high as 1 beast to 8ha and others, such as the pastured area, being considerably lower if not worthless.

The station area is 240,000ha as the natural carrying capacity is 10,000 beasts. The present Stylo area has increased the carrying capacity by 2,000 cattle, to about 12,000 cattle.

Kalumburu Mission and Carson River

Rainfall: At the Mission is 1,050mm falling from November to April, but mainly in January and February.

Areas sown at Kalumburu 120ha about 1944 and subsequently up to 1,000ha. Twenty four hectares were sown to hamata in 1977. The area sown on Carson River was 1,000ha in 1976. The Stylo sown was ploughed and ground seeded at 6kg/ha with 50kg super/ha. The 1000ha was seeded by air after a burn with no fertiliser. The *S. hamata* paddock is to be used as a nucleus seed paddock.

The original seeded area has been supered at 50kg/ha every 3 years. The Stylo paddock seeded in 1944 has deteriorated and the carrying capacity is not really known. The carrying capacity is estimated at 1 beast/1.6ha with adequate fencing and cattle control.

Beverly Springs

Rainfall: Average 1959-1976 is 925mm

The area sown to Townsville Stylo and other species is 1,076ha. The areas sown are in different locations on Kennedy and Isdell land systems. About 484ha have been sown into 5 small paddock areas 66ha to 133ha. This area has had crop rotations including Townsville Stylo, sorghum, mung beans and sunflower. The development of the area started in 1972 and has continued until 1977. The area (484ha) has been cleared of timber, cultivated, harrowed and seeded.

The carrying capacity of Stylo areas outside intensely fenced area is not possible to assess because Stylo areas are only part of large grazing areas.

The object of the intense area developed is to provide intensive grazing during the muster so that cows and other cattle not suitable for sale are kept in the area and not re-mixed with other cattle until the muster is over.

General Comments and Opinions by Users of Townsville Style

The annual species "Townsville Stylo" is not as productive as "Verano" (*S. hamata*) and Townsville Stylo will not be used in future if "Verano" can be purchased.

Development of Townsville Stylo is not a proposition at present cattle prices. The Manager of Doongan, Mr Doyle, suggested that a price of 95c/kg is required to make Stylo development pay. Present cattle prices 40-45c/kg.

Stocking rates definitely increase with the introduction of Stylo from say 1 beast to 20-30ha to 1 beast/4-5ha. (Higher rates than this have been suggested but little evidence was presented to support these suggestions).

Stock tend to concentrate on Stylo areas once established, but as the areas established are often part of a large paddock the productivity is difficult to assess. For the best use, Stylo should be fenced off and grazed separately.

Stylo requires phosphate for establishment and maintenance dressings at intervals to maintain its productivity.

The increased carrying capacity results in better cattle reaching better weights. Beasts of a similar age can be turned-off Townsville Stylo at a dressed weight of 280kg, compared with 200kg from natural pasture.

Ticks can be more of a problem with higher stocking rates. It is suspected that worm burdens have increased in cattle grazing the improved pastures.

Cattle will slowly spread the Stylo, which is a cheap and effective method of increasing Stylo areas.

The persistence and productivity on "Townsville Stylo" can be inhibited without the application of super. Anthracnose has recently emerged as a problem with this species.

The development of large "Townsville Stylo" areas or the introduction of other species is expensive and requires large capital resources.